Using tau polarisation..

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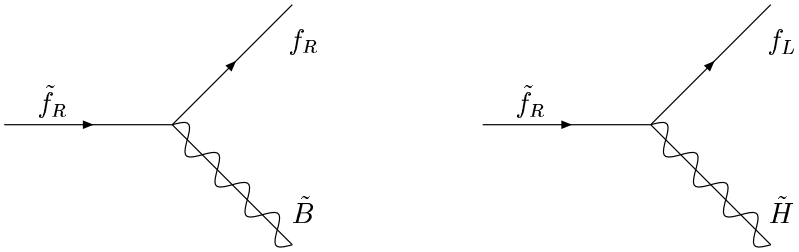
Tau particles are polarised $\tilde{\tau} \to \tau + \tilde{\chi}_1^0$

$f = t/\tau$



$$
\begin{aligned}
P_\tau &= \frac{\Gamma(\tau_R) - \Gamma(\tau_L)}{\Gamma(\tau_R) + \Gamma(\tau_L)} = \frac{(a_{11}^R)^2 - (a_{11}^L)^2}{(a_{11}^R)^2 + (a_{11}^L)^2} \\
a_{11}^R &= -\frac{2g}{\sqrt{2}} N_{11} \tan\theta_w \sin\theta_{\tilde{\tau}} - \frac{g m_\tau}{\sqrt{2} m_W \cos\beta} N_{13} \cos\theta_{\tilde{\tau}} \\
a_{11}^L &= \frac{g}{\sqrt{2}} [N_{12} + N_{11} \tan\theta_W \cos\theta_{\tilde{\tau}}] - \frac{g m_\tau}{\sqrt{2} m_W \cos\beta} \sin\theta_{\tilde{\tau}} N_{13}
\end{aligned}
$$

$$
\tilde{\chi}_1^0 = N_{11}\tilde{B} + N_{12}\tilde{W}_3 + N_{13}\tilde{H}_1^0 + N_{14}\tilde{H}_2^0
$$

$$
P_\tau = \frac{(4 - x_w^2) - (4 + x_w^2 - 2y_h^2)\cos 2\theta_{\tilde{\tau}} + 2(2 + x_w) y_h \sin 2\theta_{\tilde{\tau}}}{(4 + x_w^2 + 2y_h^2) - (4 - x_w^2)\cos 2\theta_{\tilde{\tau}} + 2(2 - x_w) y_h \sin 2\theta_{\tilde{\tau}}}
$$

$$
\begin{aligned}
x_w &= \frac{\tan\theta_w N_{11} + N_{12}}{\tan\theta_w N_{11}}; \quad y_h = \frac{m_\tau x_h}{\cos\beta m_W}; \\
x_h &= \frac{N_{13}}{\tan\theta_w N_{11}} \\
&\Rightarrow P_\tau = P_\tau(|M_1|, |\mu|, \tan\beta, \theta_{\tilde{\tau}}, \ [\phi_1, \phi_{\tilde{\tau}}])
\end{aligned}
$$

Gajdosik,Godbole,Kraml, hep-ph/0405167

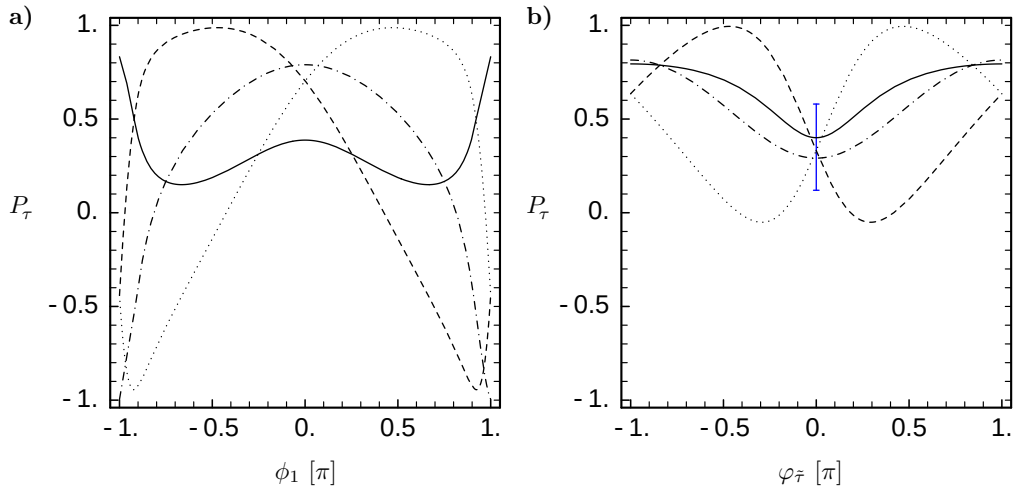


Figure 1: Polarization of the tau lepton coming from $\tilde{\tau}_{\rightarrow}\tau\tilde{\chi}_1^0$ decays for $\theta_{\tilde{\tau}}$=130 and $\tan\beta$=10: in a) as a fucntion of ϕ_1 for M_2=380 GeV, $|\mu|$=125 GeV; (b) as a function of $\phi_{\tilde{\tau}}$ for $|\mu|$ =125 GeV and M_2 adjusted to keep $m_{\tilde{\chi}_1^0}$ =100 GeV. The full, dashed, dotted and dash-dotted lines are for $\phi_{\tilde{\tau}}(\phi_1)$=0, $pi/2, -pi/2, pi$ in a(b).

$$\begin{aligned}\tau^+ &\rightarrow \pi\nu_\tau(12.5\%)\\ &\rightarrow \rho^+\nu_\tau \rightarrow \pi^+\pi^0(24\%)\\ &\rightarrow a_1\nu_\tau \rightarrow \pi^+\pi^0\pi^0\nu_\tau(7.5\%)\end{aligned}$$

"1- prong" channel

- R=$\frac{E_\pi}{E_\tau}$; R $\rightarrow$ 0/1 for P_τ=+1 and R $\rightarrow$ 0.5 for P_τ=-1

D.P.Roy, S. Raychoudhury, 1995

$$e^+e^- \rightarrow \tilde{\tau}_1\tilde{\tau}_1 \rightarrow \tau^+\tau^-\tilde{\chi}^0_1\tilde{\chi}^0_1$$

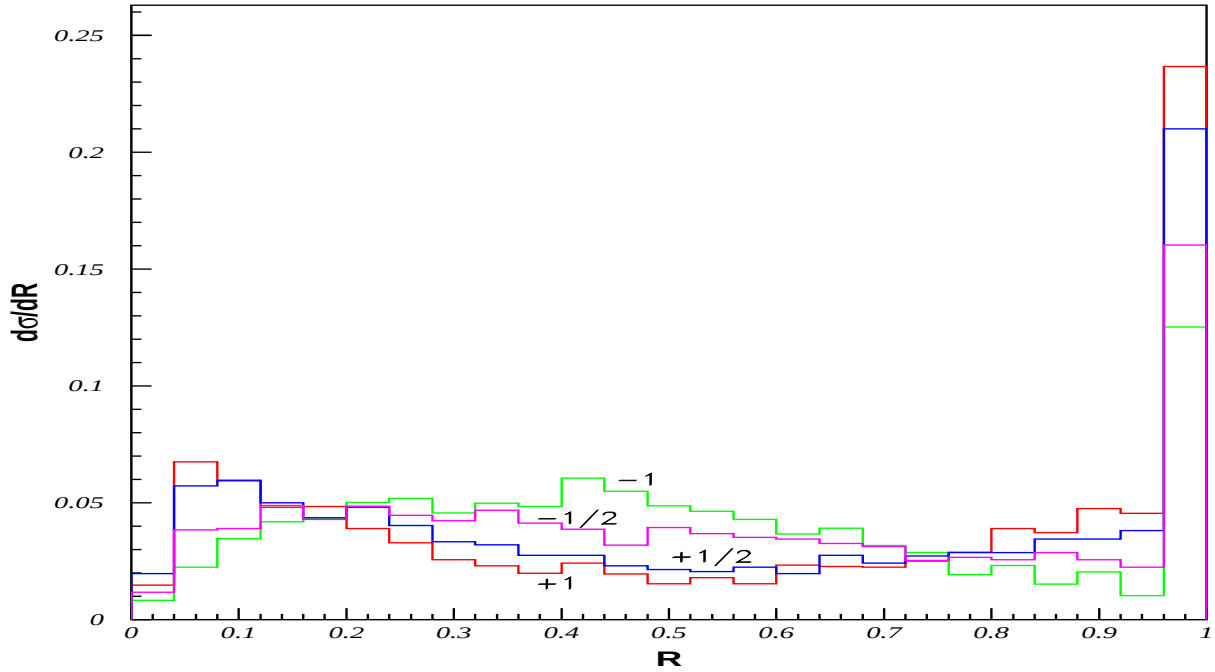


Figure 2: The normalized distributions in the fraction of τ-jet momentum carried by the charged track for P_τ= +1, +1/2, -1/2 and -1. This distribution is subject to $p^T_{\tau-jet}$ >25 GeV.

D.P.Roy, Rohini Godbole, MG, hep-ph/0411306

$$f = \frac{\sigma(0.2 < R < 0.8)}{\sigma_{tot}}$$

$\Delta P_\tau = \pm 0.03$ (± 0.05) near P_τ=$-1(+1)$

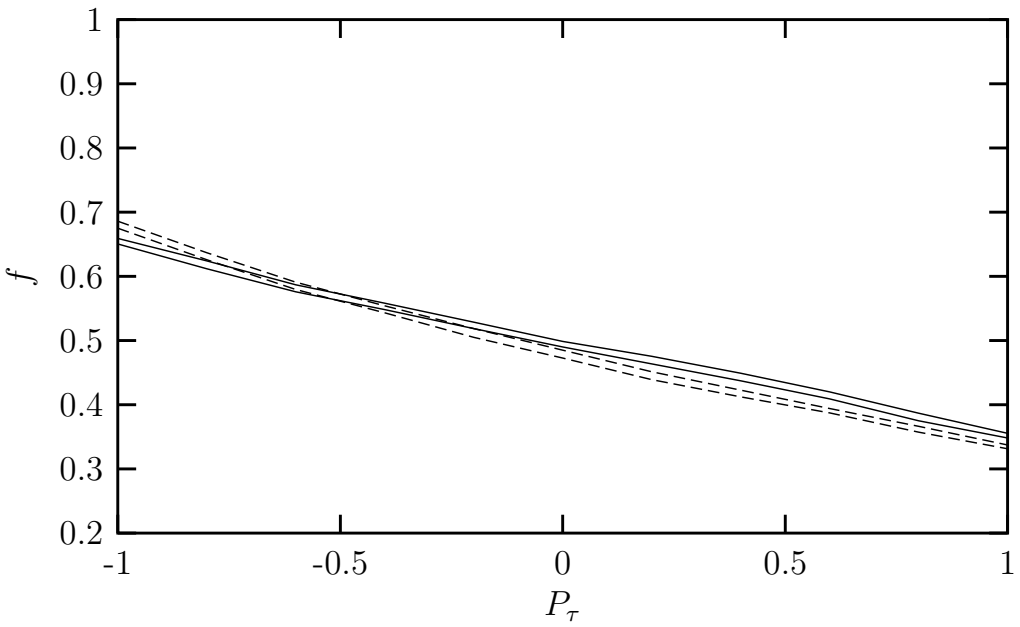


Figure 3: The fractional cross sections in the interval $0.2 < R < 0.8$ plotted against τ polarization for $p^T_{\tau-jet}$ >25 GeV (solid lines) and $p^T_{\tau-jet}$ >50 GeV (dashed lines). The upper and lower lines for each case correspond to the parameterizations of τ decay by the `ALEPH` and the collaborations respectively.

D.P.Roy, Rohini Godbole, MG, hep-ph/0411306